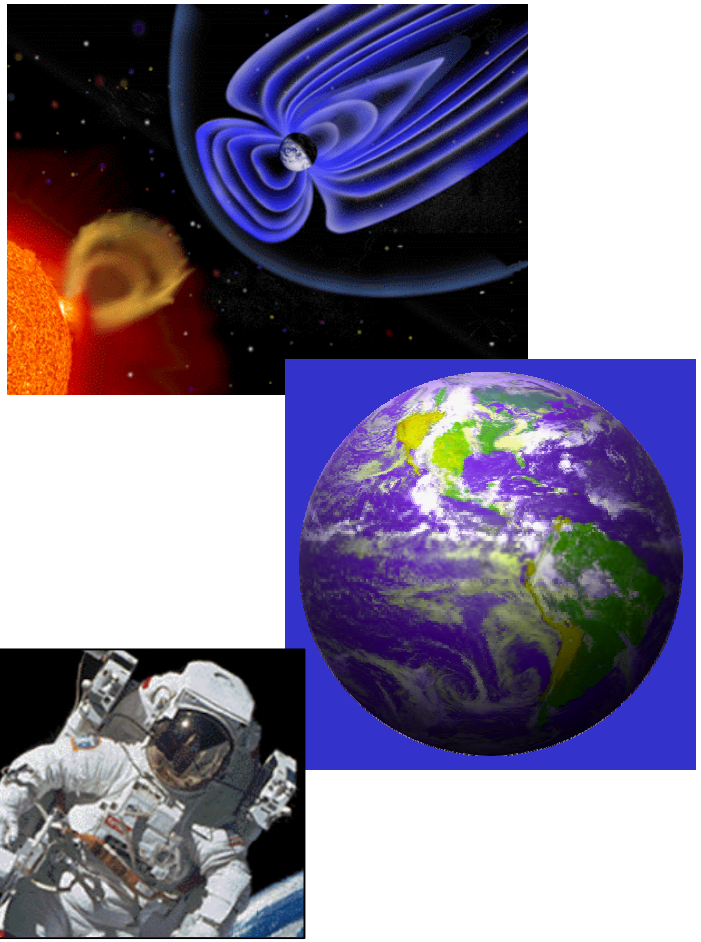


Section 1

Program Overview

Prologue

LWS is a proposed space weather-focused and applications-driven research program. Its goal is to develop the scientific understanding necessary to effectively address those aspects of the connected Sun-Earth system that directly affect life and society.

Knowledge gained from LWS-sponsored research will be applied to the design and protection of terrestrial and space-based systems of the future.

Space Weather

The term *space weather* generally refers to conditions on the Sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health.

Space Weather Needs

Broad national space weather needs include:

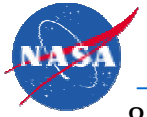
- Accurate characterization of Sun-Earth system behavior and identification of the critical physics linking the variable Sun to the Earth
- Identification and validation of indicators amongst solar heliospheric observables that could provide capable and reliable forecasts of critical space weather
- Determination of cause-and-effect relationships in support of failure and upset diagnosis, nowcasting, forecasting in space weather, and terrestrial climatology
- Development of prototype instruments, models, and products that may be suitable for an operational system
- Creation of accurate and reliable space weather models for the future

The LWS program is responsive and congruent with the National Space Weather Program (NSWP), managed by the Office of the Federal Coordinator of Meteorology (OFCM) and the Space Weather Architecture Study, initiated by the Department of Defense (DoD).

Program Value to the Nation

LWS, a research program for NASA, has value to the nation. It will directly benefit the conduct and development of the following:

- All four NASA strategic enterprises (Space Science, Earth Science, Human Exploration and Development, and Aeronautics and Space Transportation)
- Existing national space weather programs
- National security agencies (Military, Intelligence, and Reconnaissance)
- Aerospace industry
- Satellite operations
- Air transport industry
- Communications and navigation



Program Scope

This preliminary program plan describes a conceptual approach for establishing the basic elements of a space weather research system that will be in place to make measurements during the next solar maximum in 2011 and examine the associated downstream effects on the Earth and its geospace environment.

Space and ground assets required to meet the broad goals and requirements of the LWS program are included at some level of conceptualization.

Timely delivery of data, development of new tools, and enhancements to existing theoretical models that enable the prediction and forecasting objectives of operational agencies are essential elements of the program.

Program Elements

The LWS program consists of the following elements:

- The LWS space weather research network
- A Theory, Modeling, and Data Analysis (TMDA) program
- The development of a Space Environment Testbeds (SET) program
- Evolution of ongoing and establishment of new partnerships across the U.S.